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Introduction to the International Activities Program Studies

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Module Objectives

- Introduce the three main International Activities Program (IAP) Studies
  - Progress in International Reading Literacy Study (PIRLS)
  - Trends in International Mathematics and Science Study (TIMSS)
  - Program for International Student Assessment (PISA)
- For each study, describe the
  - General background information
  - Components of each study
  - Study frameworks
  - Resources available

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Three Main IAP Studies

Characteristic	PIRLS	TIMSS	PISA
Cycle (initial year)	5 years (2001)	4 years (1995)	3 years (2000)
Grades/Age Tested	4th grade	4th and 8th grade	15-year-olds
Subjects Tested	Reading literacy	Mathematics and science	Mathematics, science, and reading literacy; problem solving (2003); financial literacy (2012*, 2015*); computer-based assessments in mathematics and reading literacy (2012*) and problem solving (2012); and collaborative problem solving (2015)
Questionnaires	Student, teacher, school, home (not administered in U.S.), and curriculum	Student, teacher, school, and curriculum	Student, school, teacher (2015), and parent/guardian (not administered in the U.S.)

*International option in which the U.S. participated.
NOTE: PISA 2015 will be entirely computer-based. International comparative studies allow for comparisons of students across national/subnational education systems.

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Three Main IAP Studies (Continued)

PIRLS 2011	TIMSS 2011	PISA 2012
• Florida	Grade 4 • Florida • North Carolina Grade 8 • Alabama • California • Colorado • Connecticut • Florida • Indiana • Massachusetts • Minnesota • North Carolina	• Connecticut • Florida • Massachusetts

NOTE: State samples included only public schools.

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IAP Study Target Populations

PIRLS	TIMSS	PISA
• All students enrolled in the grade that represents 4 years of schooling, counting from the first year of International Standard Classification of Education (ISCED) Level 1, providing that the mean age at testing time is at least 9.5 years	• All students enrolled in the grade that represents 4 years of schooling, counting from the first year of ISCED Level 1, providing that the mean age at testing time is at least 9.5 years • All students enrolled in the grade that represents 8 years of schooling, counting from the first year of ISCED Level 1, providing that the mean age at testing time is at least 13.5 years	• Students enrolled in education institutions located within the national education system, in 7th grade and higher, who are 15 years and 3 months to 16 years and 2 months of age at the beginning of the testing period

NOTE: ISCED levels assist countries in providing comparable, cross-national data. ISCED Level 1 refers to primary education, and in the United States elementary school (grades 1 through 6) is classified at this level.

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IAP Study Samples

Characteristic	PIRLS	TIMSS	PISA
Sample	Intact classrooms of students in grade 4, or equivalent	Intact classrooms of students in grades 4 and 8, or equivalents	15-year-old students
Number of Participating Education Systems	2011: 53	2011 grade 4: 57 2011 grade 8: 56	2012: 65
Number of Participating U.S. Schools	2011: 370	2011 grade 4: 369 2011 grade 8: 501	2012: 161
Number of U.S Students Assessed	2011: 12,726	2011 grade 4: 12,569 2011 grade 8: 10,477	2012: 6,111

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IAP Study Assessments

All three assessments employ a multiple matrix booklet design

- No student takes the whole assessment
  - Reduces test burden
  - Provides broad subject-matter coverage
- Items are assembled into blocks or clusters, then rotated across a set number of test booklets
- Each student completes one test booklet
- Block distribution enables achievement test data to be scaled using Item Response Theory (IRT)

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IAP Studies

- Progress in International Reading Literacy Study (PIRLS)
- Trends in International Mathematics and Science Study (TIMSS)
- Program for International Student Assessment (PISA)

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PIRLS Study Components

- Student paper-based assessment—two 40-minute parts
  - Literary and informational texts
  - Constructed response and mulitple-choice items
- Student questionnaire—approximately 30 minutes
- Teacher questionnaire—approximately 30 minutes
- School questionnaire—approximately 30 minutes
- Home questionnaire (not administered in the United States)
- Curriculum questionnaire
- PIRLS Encyclopedia

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PIRLS Objectives and Framework

- Measures reading achievement/behaviors/attitudes of 4th-grade students
- Grade-specific curriculum knowledge
- Assessment organized around two purposes of reading: literary experience and acquire and use information

PIRLS defines reading literacy as

- *The ability to understand and use those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment.*

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PIRLS data can be used to learn more about

- Student reading comprehension across education systems and over time
- Student attitudes towards reading
- School resources and priorities
- Classroom learning environments

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TIMSS Study Components

- TIMSS assesses fourth- and eighth-grade students in mathematics and science using paper-based assessments
    - 4th grade - two 36-minute parts
    - 8th grade - two 45-minute parts
    - For both grades, a 5- to 10-minute break is given between the two parts
    - Constructed-response and multiple choice items are included
- Student, teacher, and school questionnaires (approximately 30 minutes each)
- Curriculum questionnaire
- TIMSS Encyclopedia

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TIMSS Objectives and the TIMSS Framework

- Measures mathematics and science achievement/behaviors/attitudes of 4th- and 8th-grade students
- Grade-specific curriculum knowledge
- Assessment organized around two dimensions: content domains and cognitive domains

Domains	Mathematics		Science	
	Grade 4	Grade 8	Grade 4	Grade 8
Content	Number, Geometric Shapes and Measures, Data Display	Number, Algebra, Geometry, Data and Chance	Life science, Physical science, Earth science	Biology, Chemistry, Physics, Earth Science
Cognitive	Knowing, Applying, Reasoning			

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TIMSS Videotape Studies

- 1995 Videotape Study
  - Classroom instruction recorded to provide information about learning context
  - Germany, Japan, and the United States
  - 8th-grade mathematics classrooms
- 1999 Videotape Study
  - Australia, the Czech Republic, Hong Kong-CHN, Japan, the Netherlands, Switzerland, and the United States
  - 8th-grade mathematics, and/or science classrooms

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TIMSS Curriculum Model

- Intended curriculum
  - Instructional and learning goals as defined at the system level
- Implemented curriculum
  - Curriculum interpreted by and made available to teachers
- Attained curriculum
  - Content that students had learned and their attitudes toward these subjects
- Social and cultural contexts for learning
- Curriculum information summarized in TIMSS Encyclopedia and obtained separately in TIMSS contextual questionnaires
  - More detail regarding the TIMSS questionnaires and Encyclopedia is presented in the module titled, Data Collected Through the IAP Studies

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TIMSS data can be used to learn more about

- Student mathematics and science performance across education systems and over time
- Student perceptions of mathematics and science
- School resources and priorities
- Classroom learning environments

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PISA Assessment Cycle

Assessment year	2000	2003	2006	2009	2012	2015 (entirely computer-based)
Subjects assessed	READING Mathematics Science	Reading MATHEMATICS Science Problem solving	Reading Mathematics SCIENCE	READING Mathematics Science	Reading MATHEMATICS Science Problem solving Financial literacy (optional) CBA in reading & mathematics (optional)	Reading Mathematics SCIENCE Collaborative problem solving Financial literacy (optional)

- For each administration all three subjects/domains assessed but one rotating subject/domain receives focus
- Each subject is a major domain every 9 years
- Subscales are assessed only on the focus subject for each administration

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PISA 2012 Study Components

- Student paper-based assessment—four 30-minute parts
  - Mathematics, science, and reading literacy items, plus financial literacy for participating education systems
  - Multiple-choice and constructed-response items
- Student computer-based assessment—two 20-minute parts
  - Mathematics and reading literacy
  - problem-solving
  - Multiple-choice and constructed-response items
- Student questionnaire—approximately 30-minutes
- School questionnaire—approximately 30-minutes
- Teacher questionnaire (2015)—approximately 45-minutes
- Parent questionnaire (not administered in the United States)

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PISA Objectives and the PISA Framework

- Measures "yield" of learning at age 15 – how well students can apply their knowledge and skills in real-world contexts to meet challenges of society
- Measures literacy (processes, concepts, application of knowledge and skills)
- Not a direct measure of grade-specific curriculum
- Accounts for learning both inside and outside of school

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PISA Literacy Definitions

Mathematics literacy

- *An individual's capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It assists individuals to recognize the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged, and reflective citizens.*

Science literacy

- *An individual's scientific knowledge and use of that knowledge to identify questions, acquire new knowledge, explain scientific phenomena and draw evidence-based conclusions about science-related issues. It includes understanding of the characteristic features of science as a form of human knowledge and enquiry, and awareness of how science and technology shape our material, intellectual and cultural environments. It also includes willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen.*

Reading literacy

- *Reading literacy is understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.*

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PISA Literacy Definitions (Continued)

Problem solving

- *An individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one's potential as a constructive and reflective citizen.*

Financial literacy

- *Knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life.*

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PISA data can be used to learn more about

- Student understanding of mathematics, science, and reading knowledge in real-world contexts
- Student attitudes and learning strategies
- School resources and priorities
- Classroom learning environments
    - Teacher education and professional development
    - Teacher beliefs, attitudes, and practices

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Module Summary

- Introduced the three main International Activities Program (IAP) Studies
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Module Resources

- International Activities Program (IAP) Studies
- Progress in International Reading Literacy Study (PIRLS)
- Trends in International Mathematics and Science Study (TIMSS)
- Program for International Student Assessment (PISA)
- Samples
- Multiple matrix booklet design
- IRT
- PIRLS Framework
- TIMSS Framework
- TIMSS Videotape Studies
- PISA Framework